



Affidavit of Brian P. Roarty, Inventor

My name is Brian P. Roarty and I am the inventor of the invention described in Application 10/797,255, filed 03/10/2004, titled "**Implementation And Application Of Phase Change In A Fluid Flowing Through A Nozzle**", and subject of the Office Action to which this Declaration and Affidavit is part of the Response to. I hereby state that I have read, understood, and adopt the contents of this Affidavit with full knowledge thereof. I am a U. S. citizen and acknowledge, as stated in my original application, the duty to make known to the U.S. Patent Office all information material to its patentability, whether favorable or unfavorable thereto, that is known or becomes known to me. I have faithfully fulfilled that duty up through the present date of signing of this declaration and intend to continue doing so.

My mailing address remains the same as given in the original application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and believe I believe to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I recognize and acknowledge some of the enabling challenges cited by the examiner. I, and another person, have been experimenting with and developing a protocol to treat a metal surface that causes an exothermic reaction and studying the results for a number of years. An early version of that protocol has been granted U.S. patent number 7,442,287 under the name "**Material surface treatment method using concurrent electrical, vibrational and photonic stimulation**". That patent describes a protocol applied in a static case, i.e., a liquid medium in a beaker, rather than the dynamic case of the medium moving through the nozzle. I reasonably anticipate and expect to file a subsequent patent extending the protocol based on reproduced results and further experimentation undertaken between the date of application for that patent (April 28, 2006) and the present, and reporting advanced results within the next few months.

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Responding to the specific objections raised in the Office Action, by paragraph, as found on page 6 thereof, I specifically state:

- a. The Office Action's objection to lack of specific information concerning temperatures, specifically "quantitative requirements as to the amount of heat necessary to cause the phase change of the fluid". Such quantitative requirements would strictly follow Boyle's Law pertaining to the pressure/temperature conversion of liquid to gaseous phases, pursuant to the geometry of the nozzle and the flow rate of temperature into and through the nozzle, and thus are thoroughly disclosed per standard prior engineering art concerning fluid and thermal transport phenomena.
- b. Continuous heating of the nozzle from a source exterior to the system will be required to sustain the temperature at or near the boiling point in the throat and the exhaust of the nozzle until the exothermic reaction is achieved in the throat of the nozzle. This aspect is now known to those skilled in the art and was disclosed in Patent 7,442,287 (which does specifically state "...while that solution is maintained at an elevated temperature at or near the boiling point." Col. 1, lines 43-44.) After that, the temperature will be sustained by the release of heat at the interior surface of the nozzle and within the fluid medium. The system will require a steam condenser and heat exchanger to rid itself of excess heat. This aspect of the system is not mentioned in the specification as it is also commonly known in the prior art.
- c. The nature of the exothermic reaction caused by the inventor's protocol – the theoretical model, at least – is not well understood at this time. What has been observed and is known in the current art is that after the initial period required to achieve the exothermic reaction, the stimuli, or "the indirect excitation means", cause periodic bursts of intense heat; tests after running the protocol give evidence of temperatures far above the boiling point of the liquid in the thermal history of the sample.

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- d. The inventor is aware that others claim the need for a D/Pd atom ratio of .89 as the threshold for “excess heat”. That claim associates with the work of McKubre and others at SRI International in Menlo Park, California. The inventor has met with McKubre and some of his colleagues, and has some knowledge of their work, and they have some awareness of his. McKubre and others predicate their work on a model in which deuterium atoms are assumptively contained within the metal lattice of palladium. That model further assumes that this containment forces proximity and confinement which permits adjacent deuterium atoms to interact in ways that are not otherwise stochastically possible at low temperatures. These assumptions then imply interaction which is believed to permit the deuterium nuclei to get close enough to each other that they fuse. The protocol described in the patent referenced above and the present application do not depend upon that model. Specifically, the use of a DC current has proven to be optional, and it is not clear how much the palladium is loaded with deuterium, or if it is loaded at all. I had and have not measured that ratio and do not believe it to be important.
- e. The inventor fails to understand what the examiner means by “calibration procedures”. Assuming that this references a means of controlling the flow of liquid through the nozzle so as to maintain the exothermic reaction, that can be accomplished with temperature sensors in the inlet and exhaust of the nozzle providing readings to a feedback system, which in turn controls a valve regulating the flow of liquid through the nozzle. Again, these are not mentioned in the specification as being commonly known in the prior art.
- f. Evidence of LENR reproducibility is now in the public domain, thanks to “60 Minutes” and pending U.S. and international patent applications in the domain of LENR, even if the theoretical model is as yet subject to experimental evaluation of all of the potential explanations possible. LENR as a functional reality is now known to those skilled in the field. The protocol disclosed in the Patent 7,442,287, and the enhanced protocol referred to above have proven to be completely reproducible by the inventors. The latter has not yet been

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provided to others to establish replication as it is still being reduced to practice and to assure compliance with the Office's desire for limitations upon the experimentation necessary for enablement.

As stated above, the nature of the exothermic reaction induced by the inventor's protocol is not clearly understood and various theoretical explanations (lumped together as LENR) currently exist. Evidence of fusion products as cited in Dash (distortion of the palladium cathode, microscopic evidence of localized melting, and localized concentrations of elements that could have been produced by atomic transformations), and not just generalized heating, have been observed – see Figures 4-6 of patent 7,442,287; and evidence which is explainable by “quantum tunnelling” or some other theoretically new quantum function is also described therein (Col. 6, line 59 – Col. 7, line 7). I accept that one or more of the DOE reviewers expressed doubts, but affirmatively assert that the subsequently revealed experimental, and reproducible, evidence, renders all flat denials impossible. Post-2004 efforts and evidence thereof known to those currently skilled in the field (as opposed to those critiquing it without actual, practical, experimental practice) prove the reality of exothermic reactions through the phenomena denoted as LENR. Using the protocols and referencing in the above-cited and other post-2004 patent applications, including those by McKubre et al. (U.S. Patent Application 20090086877 A1, filed Nov. 1, 2008 and published April 2, 2009, which states at paragraph 0305: “[0305]The conclusions of the results were that the experiment with Pd yielded between 50 mW and 240 mW of excess power starting on day 4 (Nov. 29, 2002) and continuing through day 9 (Dec. 4, 2002) in correlation with the metal co-deposition and laser stimulation. Given that the volume of the cathode was 0.00875 cc, the maximum power density was approximately 28 W/cc. This output compares favorably with uranium fission, which produces approximately 50 W/cc.”; U.S. Patent Application 20070280398, filed Dec. 5, 2006 and published Dec. 6, 2007, which states at paragraph 02: “[0002] This invention relates generally to the use of electrolytic cells for the creation of low energy nuclear reaction (LENR) which generates heat.”) establish irrefutably that something is happening. That that process (exothermic LENR) can be exploited, as laid out in the present invention, in a way to produce useful “work” by harnessing the energy

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released, is also certain. The U.S. Navy has recent issued a press release (<http://www.google.com/hostednews/afp/article/ALeqM5j2QobOOQnlULUZ7oalSRUVjnlHjng>) as of May 4, 2009, in which their researchers "unveiled what they say is "significant" evidence of cold fusion". Such evidence is being re-evaluated, and reproduced in ongoing current experiments with additional mensuration and specific test observations to verify and establish reproducible and reducible-to-practice specifics sufficient to support an anticipated application for a patent for the enhanced protocol referred to above.

The energy densities achieved by this applicant and McKubre, et al., have proven sufficient for a phase change in portions of the fluid to be observed in the static conditions of a beaker. Although it is not clear whether the heat is generated solely at or near the surface of the electrodes or whether it is generated there and also within the liquid medium, since the present application only requires a phase change in the fluid, the precise location of such a change is not a consideration that affects the invention's patentable utility.

If French's work is presented as evidence of prior art, it is also true that the Greek philosopher Hero taught a system in 412 BCE wherein an engine rotated around an axis due to the thrust provided by steam escaping from his engine. Unfortunately, Hero's engine, while interesting, produced no useful work. However, it appears that both Hero and French depended upon that steam being created by energy introduced into the system from an external source. The nozzle claimed in this application does not rely upon energy being introduced from an external source for sustained operation. Rather, the energy latent in the liquid medium is released within the system, and used to sustain its continuing operation, after LENRs are achieved. The energy released using the protocol disclosed in patent 7,442,287 was not quantified through measurement but was inferred from the products as being measurably more than would be required, given standard efficiencies, to both provide continuous operation of the stimulating means and additional 'work' through movement of the phase-changing fluid through the nozzle as disclosed in

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the present invention. The rate of flow of the fluid appears to be an important aspect of the system's continued operation without damage to its structural elements.

Further to the point of prior art, the inventor is well aware of the principles and operation of steam turbines. He served during the years 1967 through 1969 as an officer in the U.S. Navy reserve aboard two U.S. Navy vessels as the officer in charge of their steam boilers and main turbine engines.

Dated: May 6, 2009

By: Brian P. Roarty

Brian P. Roarty

State of California County of SAN MATEO
Subscribed and sworn to (or affirmed)
Before me on this 6th day of MAY, 2009, by
BRIAN P. ROARTY
personally known to me or proved to me on
the basis of satisfactory evidence to be the
person(s) who appeared before me.

Signature [Signature]

(Seal)

